# Work Order ID 99315

*99315*

*April-05-13 1:17:29 PM*



**Item ID:** D6104-011 **Accept** *N900040100* **Setup Start** *NS1*

**Revision ID:** **Stop** *NS2*

**Item Name:** 17-4 SS Roundbar 6.50"OD

**Start Date:** 4/04/13 **Start Qty:** 12.00 *12*

**Required Date:** 4/04/13 **Req'd Qty:** 12.00 *12*

**Reference:**

**Cust Item ID:**

**Customer:**

**Run Start** *NR1*

**Stop** *NR2*

**Approvals:** **Process Plan:** MLJ **Date:** 13-04-08 **Tooling:** _____ **Date:** _____

**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| **Draw Nbr** | **Revision Nbr** | | | | | | | | |
| D6104 | Rev B | | | | | | | | |
| 100 | | 0.00 | | | | | | | |
| *100* | PURCHASING | | | | | CL 13/04/10 | 12 | | |
| Purchasing | **Memo** | 0.00 | | | | | | | |
| Purchasing | Issue P/O: 19532 a)Description: S.S round billet b) Ø6.50" x 4.100" longc) Tolerance on all dimensions are +0.030"/-0.000"d) Material: 17-4PH Stainless steele) Min UTS = 170 KSI (38 HRc) Material certification required | | | | | | | | |
| 110 | Receive & Inspect for Damage & Mat'l Certs | 0.00 | | | | | | | |
| *110* | | | | | | 13/4/22 | 12 | | |
| Packaging | **Memo** | 0.00 | | | | | | | |
| Packaging | Ensure material certification is attached | | | | | | | | |
| 120 | QC6- Inspect dimensions to drawing | 0.00 | | | | | | | |
| *120* | | | | | | CL 13/04/22 | 12 | 0 | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | Ensure Material certification comply to Dwg D6104 | | | | | | | | |

DQA: _____ Date: _____

NCR: Yes / No

# WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: Date:

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Work Order Update ☐

**AGAINST DEPARTMENT/PROCESS**

- Skid-tube ☐
- Machining ☐
- Thermoforming ☐
- Large Fab ☐
- Crosstube ☐
- Small Fab ☐
- Finishing ☐
- Composite ☐
- Water Jet ☐
- Prod. Eng. Coor. ☐
- Rec/Store/Packaging ☐
- Supplier ☐
- Engineering ☐
- Quality ☐
- Other ☐

| Root Cause | | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Setup | ☐ | | | | | | | | | |
| Other | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

- ☐ Bending
- ☐ Centre Not Concentric to O/S
- ☐ Cracks
- ☐ Crushed/Crimped
- ☐ Cuffs
- ☐ Heat Treat
- ☐ Inspection Strip in Tube
- ☐ Ripples in Bend
- ☐ Torque Waves in Extrusion
- ☐ Turning Sequence
- ☐ Wave/Twist in Tube

**General**

- ☐ Bend
- ☐ BOM/Route
- ☐ Broken/Damaged
- ☐ Burrs
- ☐ Contamination
- ☐ Countersink
- ☐ Cut Too Short
- ☐ Drill Holes
- ☐ Drawing
- ☐ Finish
- ☐ Folio
- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete
- ☐ Instructions Incomplete/Unclear
- ☐ Maintenance
- ☐ Mislabeled
- ☐ Misread
- ☐ Offset
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Ovalized
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

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# Work Order ID 99315

*99315*

*April-05-13 1:17:29 PM*

**Item ID:** D6104-011 **Accept** *N9000040100* **Setup Start** *NS1*

**Revision ID:**

**Item Name:** 17-4 SS Roundbar 6.50"OD **Stop** *NS2*

**Start Date:** 4/04/13 **Start Qty:** 12.00 *12* **Cust Item ID:**

**Required Date:** 4/04/13 **Req'd Qty:** 12.00 *12* **Customer:**

**Reference:**

**Run Start** *NR1*

**Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____ **Stop** *NR2*

**QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|---|---|---|---|---|---|---|---|---|---|
| 130 | Identify as per dwg & Stock Location: MAT 43 | 0.00 | ok 13/04/22 | | | 12 | 0 | | |
| *130* | | | | | | | | | |
| Packaging | **Memo** | 0.00 | | | | | | | |
| Packaging | | | | | | | | | |
| 140 | QC21- Final Inspection - Work Order Release | 0.00 | | | | | 13/4/23 | | |
| *140* | | | | | | | | | |
| QC | **Memo** | 0.00 | | | | | | | |
| Quality Control | | | | | | | | | |

ok 12-4-23

DQA: _____ Date: _____

NCR: Yes / No

# WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: Date:

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Work Order Update ☐

**AGAINST DEPARTMENT/PROCESS**

- Skid-tube ☐
- Machining ☐
- Thermoforming ☐
- Large Fab ☐
- Crosstube ☐
- Small Fab ☐
- Finishing ☐
- Composite ☐
- Water Jet ☐
- Prod. Eng. Coor. ☐
- Rec/Store/Packaging ☐
- Supplier ☐
- Engineering ☐
- Quality ☐
- Other ☐

| Root Cause | | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Doc/Data | ☐ | | | | | | | | | |
| Equip/Tooling | ☐ | | | | | | | | | |
| Operator | ☐ | | | | | | | | | |
| Material | ☐ | | | | | | | | | |
| Setup | ☐ | | | | | | | | | |
| Other | ☐ | | | | | | | | | |
| Process | ☐ | | | | | | | | | |
| Supplier | ☐ | | | | | | | | | |
| Training | ☐ | | | | | | | | | |
| Unapproved | ☐ | | | | | | | | | |

**FAULT CATEGORY**

**Landing Gear**

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**General**

- ☐ Bend
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- ☐ Grain
- ☐ Hardware
- ☐ Inspection Incomplete
- ☐ Instructions Incomplete/Unclear
- ☐ Maintenance
- ☐ Mislabeled
- ☐ Misread
- ☐ Offset
- ☐ Out of Calibration
- ☐ Out of Sequence
- ☐ Outside Dimensions
- ☐ Ovalized
- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
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- ☐ Wrong Stock Pulled
- ☐ Other

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# Picklist Print

*April-05-13 1:17:29 PM*



**Work Order ID:** 99315

**Parent Item:** D6104-011 **Start Date:** 4/04/13 **Required Date:** 4/04/13

**Parent Item Name:** 17-4 SS Roundbar 6.50"OD **Start Qty:** 12.00 **Required Qty:** 12.00

**Comments:** IPP A02.12.02New Issue KJ/RF

| Component Item ID/ Item Name | Replacement Item ID | Mfg/ Purch | Bin Item | Primary Location | Last Location | Route Seq ID | Unit of Measure | Qty on Hand | Qty per Kit | Total Qty | Qty Issued | Date Issued | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **D6104-011P**<br>17-4 SS Roundbar 6.50"OD | | Purchased | No | | | 110 | Each | 0.0000 | 1 | **12** | | | |

4/3/5/22 (12)

DQA: _____ Date: _____

NCR: Yes / No

# WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: Date:

Work Order: _____

Part No. _____

NCR No. _____

**DISPOSITION**

- Rework ☐
- Scrap ☐
- Use-as-is ☐
- Work Order Update ☐

**AGAINST DEPARTMENT/PROCESS**

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- Crosstube ☐
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- Finishing ☐
- Composite ☐
- Water Jet ☐
- Prod. Eng. Coor. ☐
- Rec/Store/Packaging ☐
- Supplier ☐
- Engineering ☐
- Quality ☐
- Other ☐

| Root Cause | | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---|---|---|---|---|---|---|---|---|---|---|
| Doc/Data | | | | | | | | | | |
| Equip/Tooling | | | | | | | | | | |
| Operator | | | | | | | | | | |
| Material | | | | | | | | | | |
| Setup | | | | | | | | | | |
| Other | | | | | | | | | | |
| Process | | | | | | | | | | |
| Supplier | | | | | | | | | | |
| Training | | | | | | | | | | |
| Unapproved | | | | | | | | | | |

**FAULT CATEGORY**

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- ☐ Offset
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- ☐ Outside Dimensions
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- ☐ Over/Under tolerance
- ☐ Part Incorrect
- ☐ Part Lost/Missing
- ☐ Part Moved
- ☐ Positioned Wrong
- ☐ Power Loss/Surge
- ☐ Pressure/Forced
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

_____

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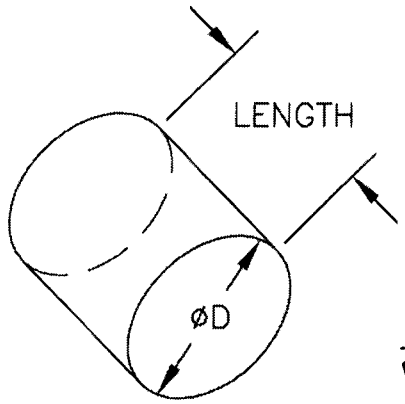
_____

| | | | |
|---|---|---|---|
| DESIGN | DRAWN BY | DART AEROSPACE LTD<br>HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | APPROVED | DRAWING NO. D6104 | Rev. B<br>SHEET 1 OF 1 |
| DATE 02.11.25 | | TITLE ROUND BILLET, 17–4 | SCALE NTS |

| | | |
|---|---|---|
| A | 01.04.10 | NEW ISSUE |
| B | 02.11.25 | CLARIFY ALLOY SPEC<br>ADDED D6104–009/–011<br>REDUCE LENGTH OF BILLETS |

RELEASED

# SPECIFICATION CONTROL DRAWING




99315 MCS
13-04-08

MATERIAL: 17-4 PH SS (AMS 5643 OR AISI 630) MIN UTS = 170 KSI (38 HRc)

PURCHASE MATERIAL ACCORDING TO THE FOLLOWING TABLE. SPECIFY ALLOY, DIAMETER x LENGTH (+0.030/-0.000) AS SHOWN.

TOLERANCE ON ALL DIMENSIONS IS +0.030/-0.000.

ALL DIMENSIONS ARE IN INCHES

| Part No. | Alloy | D (Diameter) | Length |
|---|---|---|---|
| D6104-001 | 17-4 PH STAINLESS STEEL | ∅3.00 | 3.80 |
| D6104-003 | 17-4 PH STAINLESS STEEL | ∅3.25 | 3.80 |
| D6104-005 | 17-4 PH STAINLESS STEEL | ∅4.00 | 5.10 |
| D6104-007 | 17-4 PH STAINLESS STEEL | ∅4.50 | 5.10 |
| D6104-009 | 17-4 PH STAINLESS STEEL | ∅5.25 | 4.10 |
| D6104-011 | 17-4 PH STAINLESS STEEL | ∅6.50 | 4.10 |
| | | | |
| | | | |

DART AEROSPACE

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

# PURCHASE ORDER

**Purchase Order ID PO19532**

**Purchase Order Date** 4/10/13
**PO Print Date** 4/10/13



**Order From :** VC-MET001

METAUX CASTLE
A.M. CASTLE & CO. (CANADA) INC. - C/O 910720
P.O. BOX 4090 STN A
TORONTO, ON M5W OE9
CA

| | | | |
|---|---|---|---|
| **Contact Name** | | **Buyer** | Chantal Lavoie |
| **Vendor Phone** | 514 694 9575 | **Requisition Nbr** | |
| **Vendor Fax** | 514 695 3281 | **Tax Resale Nbr** | 10127-2607 |
| **Vendor Account Nbr** | | **Terms** | Net 30 |
| | | **Currency** | CAD |
| | | **FOB** | Destination-Collect |

**Ship To :** DART AEROSPACE LTD 1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

FAXED 04/13/04/10

| Line Nbr | Reference / Revision ID / Vendor Part Number | Description / Mfg ID | Req Date / Taxable | Req Qty / Unit of Measure | Ship Method | Unit Price | Extended Price |
|---|---|---|---|---|---|---|---|
| 1 | D6103-003P | round alum billet | 4/19/13<br>Yes | 20.00<br>Each | Yours ppd | $65.0000 | $1,300.00 |
| | | **Special Inst:** | As per DWG: D6103 Rev: B<br>B99312<br>Aluminum Round Billet 03.500" x 12.500" long<br>Tolerance on all dims are +0.030"/-0.000"<br>Mat: 7075-T7351 (QQ-A-225/9) | | | | |
| 2 | D6104-011P | 17-4 SS Roundbar 6.50"OD | 4/19/13<br>Yes | 12.00<br>Each | Yours ppd | $188.0000 | $2,256.00 |
| | | **Special Inst:** | AS PER DWG D6104 REV. B<br>B99315<br>MATERIAL: 17-4 PH SS AS PER AMS 5643 OR AISI 630<br>SIZE: 6.50" X 4.10" LONG | | | | |

4/3/4/22

MATERIAL CERTIFICATION REQ'D UPON DELIVERY

**PO Total:** **$3,556.00**

No substitution or deviation without consent.
Certificate of Conformity or Material Certification required - YES NO

**Change Nbr:** 1 **Change Date:** 4/10/13

Castle Metals®

A. M. Castle & Co.

# PACKING SLIP/ CERTIFICATE OF CONFORMANCE

COPIE



Pack Slip No:1365444

| Ship From: | Sold To: | Ship To: | Deliver To: |
|---|---|---|---|
| A. M. Castle & Co.<br>Cleveland<br>26800 Miles Road<br>Bedford Heights, OH 44146 | DART AEROSPACE LTD<br>1270 ABERDEEN<br>HAWKESBURY, ON K6A 1K7<br>CA | DART AEROSPACE LTD<br>1270 ABERDEEN<br>HAWKESBURY, ON K6A<br>1K7 CA | DART AEROSPACE LTD<br>1270 ABERDEEN<br>HAWKESBURY, ON K6A 1K7 CA |

| Date Shipped | F.O.B. | Freight Terms | Carrier | BOL No | Delivery No |
|---|---|---|---|---|---|
| 19-APR-2013 | ORIGIN | Prepaid | CASTLE_NETWORK | 1372575 | 118614228 |

| Shipment Details | Final Destination Branch - |
|---|---|

| Order No | Line No | Item No | Description |
|---|---|---|---|
| 2809416 | 1 | 15003.MO | 6.5000.RD.17CR-4NI.STAINLESS.RT.SOL TR.COND A.120.0000-168.0000<br>CUT TO 4.1 IN ( + .1250/- .0000 IN) - BAND SAW CUTTING<br>SPECIFICATIONS: AMS 5643 |

| Purchase Order No | Part Number | Ordered Qty | Invoice Qty |
|---|---|---|---|
| 19532 | YOUR ITEM NUMBER:<br>D6104-011 | 12.00 PCS | 12.00 PCS |

CK 13/04/22

| Details | SHIP AS SOON AS POSSIBLE |
|---|---|

| Mill | Heat Number | Mech ID | PCS | Width (IN) | Length (IN) | Shipped Qty (LBS) |
|---|---|---|---|---|---|---|
| SCOT FORGE COMPANY | 53410 | | 12 | | | 480.5438 |

These commodities/technologies are subject to US Export Administration & US State Dept. Regulations and, if intended for export, were/are exported thereunder. Diversion contrary to US Law is Prohibited.

We hereby certify the material covered by this certification conforms in accordance with the above specifications and has been found to meet the applicable requirements for the material, including any specifications forming a part of the description. Test reports are on file subject to examination. All claims for defective material are waived unless made in writing to A.M. Castle & Co. within 60 days of the shipment. Material cut to the correct size, or material cut by the customer cannot be returned for credit.

| Reviewed by Authorized Castle Metals Representative: | | Date: | Name: |
|---|---|---|---|

SCOT FORGE
8001 Winn Rd., Box 8
Spring Grove, IL 60081
847/587-1000
FAX 847/587-2000

# PO # 203019
## MATERIAL CERTIFICATION

H00160 5 SS
Heat # 53410



CASTLE METALS

| Material Cert Number |
| --- |
| 770375 BE852R0 |

**Compliance Statements:**

The products supplied are in compliance with the quantity and quality requirements of the purchase order and specifications noted. The test reports represent the actual attributes of the items furnished and the test results are in full compliance with all applicable specifications and order requirements.

CASTLE METALS – CLE

HEAT NUMBER 53410
MECHANICAL ID 15003
ITEM CODE 01098201
LOT NUMBER 203019
PO NUMBER 2-11-13
RECEIPT DATE Scot Forge
SUPPLIER
LCS
COMMENT
APPROVED

2/19/13

Jerry Giessinger
Corporate Quality Assurance Manager
This certification has been created and reviewed in compliance with the Scot Forge QMS

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.

SCOT FORGE

8001 Winn Rd., Box 8
Spring Grove, IL 60081
847/587-1000
FAX 847/587-2000

# PO # 203019

## MATERIAL CERTIFICATION

H00160 5 SS
Heat # 53410



| SOLD | Shipping Information | Material Cert Number | Revision Date |
|---|---|---|---|
| CASTLE METALS<br>1420 KENSINGTON RD, STE 220<br>Oak Brook, IL 60523 | | 770375 BE852R0 | 02/07/2013 |

Item 1 of 1

| | |
|---|---|
| Material | Castle Metals Specification 3174-02 Rev:34, ASME SA-564 Type 630 Cond"A" 2010 Edition 2011a Addenda, ASTM A 564-10 Type 630 Condition "A", AMS 5643R Condition "A", AMS 2303F, UNS# S17400 |
| Heat Treat | per Specification |
| Destructive Test | per Specification |
| Finish | Rough Machine with allowance to finish Straightness = 1/8" in 5 FT allowing .063" to .083" stock on diameter |
| Reference | Access Code: 15003 |
| Size | OD Random Len (inches)<br>6.5 120 to 168 |
| Surface | 500 RMS Saw Cut |

| Heat Number | # of Pieces | (MILL - ELECTRALLOY CORP) |
|---|---|---|
| 53410 | 2 | MSDS Previously Sent |

Note:Additional prefix letter stamped on product with heat number is for our inventory purposes only and not relevant to heat number.

### Chemical Composition (Wt. %)

| C | Mn | P | S | Si | Ni | Cr | Mo | Cu | Al | V |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.042 | 0.51 | 0.018 | 0.0002 | 0.54 | 4.75 | 15.30 | 0.16 | 3.16 | 0.02 | 0.06 |

| Cb | N | Ta | Co | Ti | W |
|---|---|---|---|---|---|
| 0.31 | 0.038 | 0.01 | 0.04 | 0.02 | 0.02 |

| Cb+Ta |
|---|
| 0.32 |

### Rockwell Hardness Results:

| Pcs | Rockwell "C" | |
|---|---|---|
| 1 | 44 | H900/TEST PC |

### Brinell Hardness Results:

| Pcs | 3000 Kg Load |
|---|---|
| 1 | 331 |

1

2/11/13

Jerry Giessinger
Corporate Quality Assurance Manager
This certification has been created and reviewed in compliance with the Scot Forge QMS

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.

SCOT FORGE
8001 Winn Rd., Box 8
Spring Grove, IL 60081
847/587-1000
FAX 847/587-2000

# PO # 203019
## MATERIAL CERTIFICATION

H00160 5 SS
Heat # 53410



CASTLE METALS

| Material Cert Number |
| --- |
| 770375 BE852R0 |

**Other Testing or Inspections:**

Solution anneal at 1900 degrees F for 16.75 hours

ALL STEEL HAS BEEN MELTED AND MANUFACTURED IN THE UNITED STATES

PIECE TEMP AT START OF SOLUTION ANNEAL: 1900 DEG F
PIECE TEMP AT FINISH OF SOLUTION ANNEAL: < 90 DEG F

COOLING METHOD AFTER SOLUTION ANNEAL: POLYMER QUENCH

RESPONSE TO HT: TEST SAMPLE AGED AT 900 DEG F FOR 1 HOUR THEN STILL AIR COOLED/ TENSILE AND HARDNESS PERFORMED FOLLOWING AGE CYCLE

12.75: FORGING REDUCTION FROM ORIGINAL INGOT

CAST METHOD - INGOT

NO WELD REPAIR PERFORMED

MACRO ETCH PERFORMED BY EXOVA, RESULTS FOUND ACCEPTABLE (SEE ATTACHED REPORT G302483)

CLEANLINESS INSPECTION PERFORMED BY AMS 2303F
RESULTS: FREQUENCY = 0.00 SEVERITY = 0.00

MICRO EXAM PERFORMED PER AMS 2315, RESULTS NO DELTA FERRITE OBSERVED

MECHANICAL TEST PERFORMED BY EXOVA, RESULTS FOUND ACCEPTABLE (SEE ATTACHED REPORT G302537)

**Compliance Statements:**

We certify that the material listed was not processed with mercury bearing instruments and/or equipment which might cause contamination, nor was mercury handled in the immediate vicinity during the manufacturing process. We also certify that the material was not processed or cleaned with low melting point materials as alloying constituents, i.e. lead, zinc, cadmium, tin, antimony, bismuth, sulfur, or their compounds.

In accordance with the requirements of the Pressure Equipment Directive, all testing, inspection, and documentation is produced in accordance with EN 10204:2004 Type 3.1 and ISO 10474 Type 3.1.B

Material provided has been produced by Scot Forge under an approved quality program as defined within the Scot Forge Quality Management System Manual, Revision 4, dated 10/15/12.

Jerry Giessinger
**Corporate Quality Assurance Manager**
This certification has been created and reviewed in compliance with the Scot Forge QMS

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Exova
2090 East 15th Avenue
Gary
Indiana
USA
46402

T: +1 (219) 882-4283
F: +1 (219) 885-6577
E: sales@exova.com
W: www.exova.com

# Test Certificate

CUSTOMER: Scot Forge
8001 Winn Road
Spring Grove, IL 60081-0008
Attn: Dennis Behrens

Issue Date: January 31, 2013
Ref. No.: G302483
PO#: Q62316/056903
Received: 01-30-13

## MACROETCH RATING

| Sample Identification | Macroetch Rating |
|---|---|
| A-53410-TOP | No pipe, cracks, porosity, segregation, inclusions, or other imperfections observed. |
| A-53410-BTM | No pipe, cracks, porosity, segregation, inclusions, or other imperfections observed. |

This material was tested under the Exova Quality Assurance system documented in QA Manual, Rev. 4, dated July 9, 2008. The recording of false, fictitious or fraudulent statements or entries on this document may be punished as a felony under the federal law.

Specimen preparation and testing performed in accordance with: ASTM E340-00 (06) and AMS 5643R paragraph 3.4.1**.

Etching reagent used is a 1:1 mixture of HCl and water at 160 degrees F for 15 to 30 minutes.

This is to certify that the test results as contained in this report are those as contained in the company records. Test results shown in this report relate only to the items tested. Information contained in this report regarding identification, material, and/or sampling procedure is based on customer furnished information and is shown for reference purposes only.

Gary Richter
General Manager

By: Cruz Muñoz
Cruz Muñoz, Lab Manager
Signed for and on behalf of Exova

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# TEST REPORT

Customer: Scot Forge
8001 Winn Road
P.O. Box 8
Spring Grove, IL 60081
Attn: Dennis Behrens

Issue Date: February 01, 2013
Manifest No.: G302537
Purchase Order: Q62328/770375
Received: 01-31-13

## TENSILE TEST RESULTS

| Customer ID | Orig. Dia. (in.) | Test Dir. | Ultimate Tensile Strength (psi) | 0.2% OS Yield Strength (psi) | Elong. (%) | Red. Of Area (%) | Ultimate Tensile Load (lbs.) | 0.2% OS Yield Load (lbs.) | Original Gauge Length (in.) | Final Gauge Length (in.) | Final Dia. (in.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 53410/770375-1 | 0.503 | L | 205000 | 197000 | 11 | 41 | 40811 | 39043 | 2 | 2.22 | 0.385 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Note: Sample tested at Room Temperature as a threaded end specimen.

This material was tested under the Exova Quality Assurance system documented in QA Manual, Rev. 4, dated July 9, 2008. The recording of false, fictitious or fraudulent statements or entries on this document may be punished as a felony under the federal law.

13/04/22

Specimen preparation and testing performed in accordance with: ASTM E8-11.

This is to certify that the test results as contained in this report are those as contained in the company records. Test results contained in this report relate only to the items tested. Information contained in this report regarding identification, material, and/or sampling procedure is based on customer furnished information and is shown for reference purposes only.

Gary Richter
General Manager

By: Cruz Munoz, Lab Manager
Signed for and on behalf of Exova

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